An In-depth Study of Middle School Science Textbook In Jharkhand focusing on its incorporation of Advanced Cognitive Abilities

A
SYNOPSIS

SUBMITTED TO THE LNMU DARBHANGA
FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY
IN
EDUCATION

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1. INTRODUCTION

Education is the process which facilitates learning and favours the acquisition of knowledge, skills, values, beliefs and habits. It is the process through which societal accumulated knowledge, skills and values are transmitted from one generation to another generation. It is the instrument through which all the three domains of humans are developed that are cognitive, affective and psychomotor. **In the words of Gandhiji, "By education, I mean and all round drawing out of the best in the child and man – body mind and spirit".**

Dr. Radhakrishnan has also said, "Education means training the intellect, refinement of the heart and discipline of the spirit".

Education is a comprehensive and dynamic process which creates an atmosphere of learning so that learners are actively developing the potential for him to have the spiritual strength of religious, self-control, personality, intelligence, noble character and the skills needed for themselves and society. Education is the means to bring development of an individual in turn society, in turn nation and finally the world. Education is that particular way through which all the dreams of a truly democratic society can be achieved by fulfilling all the national aspirations and promote national integration and unity through the transformation of individual in the endless pursuit of excellence and perfection.

Emphasizing this, **UNESCO (2010)** has also said, "Education is a major catalyst for human development and rapid advances in education can help to achieve all the **Millennium Development Goals (MDGs).** Education has potential to achieve these goals by realizing the sensitivity towards culture, environment, economy and changing needs of the global society."

The NCF 2005, focuses more on the creativity and the overall development of children, rather that filling their brains with information. It refers to the report entitled, Learning without Burden (1993), which highlighted the problems of curriculum overload, which made

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learning a source of stress for children during their formative years. NCF 2005 emphasizes four guiding principles for providing meaningful education (a) connecting knowledge inside the school to the experiences outside the school (b) the shift of learning from rote-learning to understanding (c) going beyond the prescribed curriculum and the textbooks (d) making the examination system more flexible; hence, reaching out to every child with equality, quality and quantity. Education should aim to build a commitment to democratic values of equality, justice, freedom, concern for others' well-being, secularism, respect for human dignity and rights. It should, also, aim at fostering independence of thought and action, sensitivity to others' well-being and feelings, learning to learn and unlearn, ability to work for developing a social temper and inculcate an aesthetic appreciation.

Education is the process which prepares a child for future living. It enables a child to lead a harmonized and peaceful life. But such a life can only be related with education makes a child expertise in various skills. Advanced Cognitive Abilities include skills which a child can apply in his/her life.

Advanced Cognitive Abilities involve going beyond simply memorising facts or information and reproducing them. The component comes from Bloom's taxonomy of learning, which classifies learning objectives. Advanced Cognitive Abilities can be more challenging than other types of thinking, but it can also be more rewarding.

Bloom's taxonomy was designed with six levels to promote advanced cognitive abilities. The six levels were: knowledge, comprehension, application, analysis, synthesis, and evaluation. (The taxonomy's levels were later revised as remembering, understanding, applying, analyzing, revising, and creating.)

The top three levels of Bloom's taxonomy—which is often displayed as a pyramid, with ascending levels of thinking at the top of the structure—are analysis, synthesis, and evaluation. These levels of the taxonomy all involve advanced cognitive abilities. Students who are able to think are those who can apply the knowledge and skills they have learned to new contexts.

These abilities help thinkers adequately comprehend, analyse and critically evaluate knowledge or information. These abilities are especially important within education roles because they help encourage and develop the students' ability to exercise their minds and come up with their own conclusions, opinions and unique solutions to complex problems.

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Science education is an important component of education. It should also be capable to inculcate the Advanced Cognitive Abilities among students. This research focuses on this aspect of education and tries to find out that how science education of today's world offers opportunities so that the Advanced Cognitive Abilities can be developed in students. The challenge of improvement in science and technology requires students to possess the skills in the 21st century that will be used to compete against the era of globalization and accelerate the rapidly evolving information flow.

2. SIGNIFICANCE OF THE PROBLEM

Science subject is one of the important subjects in school education. The science subject must develop science process skills where children, observe, measure, classify, process information, interpret think on solving problems, analyze, synthesize, formulate conclusions, etc. but, it should be kept in mind that, creativity in an essential element of science.

To fulfill the aims of science education, textbooks are very fruitful. That textbook should be considered to be good which is designed or written in accordance with the aims and objectives of science teaching. Such books can provide various kinds of help to the teacher and students. By making use of such book, various advantages are obtained by both learner and learned.

In this research, the researcher will try to study the Middle School Science Textbook and find out the areas where the abilities of advanced cognition can be inculcated and developed among the students of Class 7^{th} and 8^{th}.

3. STATEMENT OF THE PROBLEM

"An In-depth Study of Middle School Science Textbook in Jharkhand focusing on its incorporation of Advanced Cognitive Abilities"

4. OPERATIONAL DEFINITION OF THE TERMS

- Middle School: Middle School is the education level between primary education and secondary education. In India, Middle School is classified as Upper Primary (Class 6–8).

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- Textbook: A textbook is a book that teaches a particular subject and that is used especially in schools.

- Advanced Cognitive Abilities: Advanced Cognitive Abilities are the mentally disciplined abilities of effectively and skillfully conceptualizing, applying, breaking down, synthesizing, as well as evaluating information or knowledge accumulated *from, or created by observation, experience, reflection, thinking,* or communication as a belief and action.

5. OBJECTIVES OF THE STUDY

The researcher will take following objectives of the research:

- To study the consistency of Class 7th Science Textbook with the incorporation of Advanced Cognitive Abilities.
- To study the consistency of Class 8th Science Textbook with the incorporation of Advanced Cognitive Abilities.
- To find out the areas where the components of Advanced Cognitive Abilities can be incorporated in Class 7th Science Textbook.
- To find out the areas where the components of Advanced Cognitive Abilities can be incorporated in Class 8th Science Textbook.
- To study manifestation of Advanced Cognitive Abilities in the middle school science textbooks with respect to curricular objectives of the NCF 2005.

6. DELIMITATION OF THE STUDY

- The study will be done on the Biological chapters of Science textbook of class 7th and 8th of JCERT focussing on Advanced Cognitive Abilities.

- The Advanced Cognitive Abilities which will be taken into consideration in this study will be as follows:

    a. Creative Thinking

    b. Critical Thinking

    c. Inquiry

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7. REVIEW OF THE RELATED LITERATURE

John, S. et al (1993) conducted a study on integration of mathematics, science and technology of education as basis for thinking and problem - solving. The sample consisted of 143 students. The findings showed that there is higher order learning in a multidisciplinary project.

Cunningsworth (1995) identified the advantage of textbook. The potential which textbooks have for serving several additional roles in any curriculum. He argues that they are an effective resource for self – directed learning, an effective resource for presentation material, a source of ideas and activities, a reference source for students, a syllabus where they reflect pre – determined learning objectives and support for less experienced teachers who have get yet to gain in confidence. And hence, the textbooks must develop critical thinking skills among the students.

Schmidt, Mcknight and Raizen (1997) identified textbooks as playing an important role in making the leap from intentions and plans to classroom activities, by making content available, organizing it, and setting out learning tasks in a form designed to be appealing to the students.

Donga, N.S. and Molia, M.S. (1998) conducted an experimental study on the effect of meta cognitive process on learning process in mathematics. Sample of the study was 66 students of standard IX. The results of the study pointed out that the learning process used by the group taught through meta cognitive process programme is better than that used by the group taught through conventional teaching programme.

Kwatra (2000) studied understanding of Science process in relation to Scientific Attitude, Creativity, Intelligence and Problem Solving Ability of Middle School Students of Bhopal Division. The major finding of study was the higher group is superior to the lower and middle groups in understanding of science processes. *(elaboration required...)*

Adazeb (2005-06) conducted a research on "A critical study of Delhi SCERT Science textbook of class VIII". As a result of the survey of teachers and students to know their perception of the Delhi SCERT science textbook researcher came to the conclusion that the textbook endorses the constructivist approach to teaching and learning and views child as active constructor of knowledge. At the same time the point to ponder upon is that the textbook is not followed in a way it should be in most of the schools. Experiments are seldom

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performed as advocated by the textbook. Wherever they are followed, it is only in the form of demonstration. Hence the idea of active learning and involving children in construction of knowledge remains unfulfilled in. Science textbooks and the activities must promote high order thinking skills among the students.

Paul and Elder (2006) argued that critical thinking is considered to be more of an art, whereas higher order thinking is done more through evaluation and analysis of a problem, many works of literature in the education field group critical thinking and higher order thinking together, assuming that one cannot be accomplished without the other (as cited in Paige et al.,2013).

Barak, David, and Uri (2007), stated that HOTS is composed of three components: critical, systems, and creative thinking, while according to Wang and Wang (2011), there are three main components in HOTS, i.e. critical thinking skills, thinking design and systems thinking. Based on these two statements, then the creative thinking skills proposed by Barak et al. (2007) similar to design thinking skills proposed by Wang and Wang (2011). Thus there are three components in HOTS, namely: (1) critical thinking skills, (2) creative thinking skills, and (3) systems thinking skills. Furthermore,

Padget (2013) expanded on Dewey's belief in the relationship between creativity and critical thinking by claiming that these two facets of higher order thinking allow students to develop multiple ways of understanding and approaching a situation (p. 23). Both creativity and critical thinking, according to Padget, should be used interchangeably since one cannot occur without the other.

Ramos et al. (2013), states that HOTS include skill such as creative and critical thinking, analysis, problem solving, and visualization. These skills involve categorizing items, comparing and contrasting ideas and theories, and being able to write about and solve problem. In the classroom, abilities and skills that include the use of HOTS are complex thinking that goes beyond basic recall of fact, such as evaluation and invention, enabling students to retain information and to apply problem- solving solution to real-world problems.

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8. RESEARCH METHODOLOGY

Research Design:

This study will employ a qualitative research design to conduct an in-depth investigation of middle school science textbooks in Jharkhand, with a primary focus on their incorporation of advanced cognitive abilities.

Sampling

The purposive sampling technique will be used to conduct this research where the following textbooks will be considered:

a. Textbook of Science for class 7th by JCERT
b. Textbook of Science for class 8th by JCERT

Planning of Data Collection

The researcher will collect the data by analyzing the Biological Chapters of Science Textbook of class 7th and class 8th prescribed by JCERT.

9. DATA ANALYSIS AND INTERPRETATION

The researcher will analyze the frequency of Advanced Cognitive Abilities incorporated in Science textbook of class 7th and 8th prescribed by JCERT.

10. CHAPTERISATION

The research report will consist of following chapters:

1. Introduction.
2. Review of related literature.
3. Research Methodology.
4. Analysis of science textbook of Class 7th by JCERT.
5. Analysis of science textbook of Class 8th by JCERT.
6. Interpretation of data.

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7. Conclusion and Suggestion.

Bibliography

Appendix

11. REFERENCES

- Abbott, B.B & Bordens, K.S (2006). Research Design and Methods. New Delhi: Tata McGraw- Hill Publishing Company LTD.
- Aggarwal, J.C. (2007). Essential of Educational Psychology. 2nd Edition. Vikas Publication House Private Limited, New Delhi
- Asthana,B. Asthana,KN. & Srivastava,V. (2010). Research Methodology; Agarwal Publications; Agra
- Mathur, S.S. (2008). Educational Psychology. Agarwal Publication, Agra
- Mangal,S.K (2008); Advanced Educational Psychology ; 2nd edition; Prentice-Hall of India Private Limited,New Delhi.
- Internet sources

  https://doaj.org/article
  http:// en.m.wikipedia.org

  Shodhganga.inflibet.ac.in
- Magazines

  Edutracks
  Indian Journal of Applied Research Education

31/ 0[illegible] 2024

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